

SUBJECT INDEX

- A**
- Acetylcholine receptor
isolation and characteriza-
tion of, 345
- Affective disorders
bipolar disorder, 377-78,
384-85
schizophrenia, 376-85
prefrontal cortex and,
379-84
- Alzheimer's disease, 343,
368, 372-75
 β -amyloid precursor pro-
tein, 373-74
APO E4, 375
neural apoptosis and, 78-
79
presenilins, 374-75
- Amputationbody representa-
tion and, 1-2, 20-21, 25
differences between
central and peripheral
deafferentation, 19-21
- Amygdala, 155, 161-77,
684-89
auditory pathways, 161-63
conditioned stimulus path-
ways, 161-66
fear conditioning and,
161-77
LTP and, 684-89
memory and, 155, 171-73
synaptic plasticity and,
684-89
- Amyotrophic lateral sclero-
sis, 80-81, 343, 368-70
neural apoptosis and, 80-
81
- Anhidrosis, 781
- Anterior cingulate cortex,
486
- Apaf-1, 73, 75, 78, 82
capase activation pathways
and, 75
cytochrome c release and,
75
- Apoptosis, 73-82, 89, 102,
233, 236, 580-82, 593
Alzheimer's disease and,
78-79
amyotrophic lateral sclero-
sis and, 80-81
caspase and, 233
caspase activation path-
ways and, 73-78
neural development and,
76-78
- chromatin condensation
and, 73-75
cytochrome c release, 73-
78, 82
Bcl-2 family of proteins
and, 75-78
- DNA fragmentation and,
73-75
- gain-of-function mutation
and, 89, 102
- Huntington's disease and,
79-80
- inhibition of, 580-82
- neural development and,
76-78
- polyglutamine-mediated
cell death, 236
- Arrestin, 45
- Attention, 473-95, 564-65
consciousness and, 564-65
learning and, 477-78, 480,
489
neuronal prediction errors
and, 473-95
- Audition, 501-23
- critical bands, 501, 515-23
inferior colliculus and,
503-4
primary auditory cortex,
501-23
multipeaked tuning
curves, 510-12
single peaked tuning
curves, 505-10
spectral integration,
501-23
subregions, 516-17
See also Hair cells; Inner
ear; Mechano-electrical
transduction
- Axon growth, 579, 592-602
age-dependent loss in,
596-99
CNS survival and regener-
ation, 592-602
control of, 592-602
electrical activity and,
595-96
glial signals that induce,
595
signaling, 593-94
trophic and inhibitory
stimuli
interaction between,
599-602
- Axonal transport, 39, 45-56
fast anterograde, 45-51
kinesin and, 45-51
motor regulation and
attachement, 53-56
retrograde, 52-54
slow, 45, 51-52
- Axotomy, 579, 588-93
CNS neurons after, 588-
90
PNS neurons after, 590-91

- B**
- Basal ganglia, 185–204
 nucleus accumbens, 185–204
 striatum, 185–86, 190–204
- Bcl-2 family of proteins
 cytochrome c release and, 75–78
- Behavior
 biological foundations of, 345
 cortical coding and, 631–37
- Behaviorism, 350
- Bipolar disorder, 377–78, 384–85
- Body representation
 amputation and, 1–2
 cortical plasticity and, 1, 5–7, 18–19, 21–29
 brainstem and, 1, 7–8, 21, 26–29
 divergence and, 1, 7–12, 18–19, 21, 28–29
 brainstem, 7–8, 21, 28
- Brainstem
 afferent selective for koniocellular layers, 137
 body representation and, 1, 7–8, 21, 26–29
 plasticity in somatosensory cortex and, 1, 7–8, 21, 26–29
 reorganization and, 1, 21
 transneuronal atrophy in, 13–16
- Bushbaby koniocellular pathway, 128–30, 138–39
- C**
- CAG repeats, 217–39
 dentatorubropallidoluysian atrophy, 217, 219, 228–30
 gain-of-function mutation of, 237–39
 Huntington's disease, 219–22, 229–30, 233–35, 359–64
- Machado-Joseph disease, 222–23, 226, 232–33
- protein aggregation and, 217, 230, 236–39
- spinobulbar muscular atrophy (SBMA), 218–20, 229–30, 237
- spinocerebellar ataxias (SCA), 217, 219, 222–28, 231–32
- ubiquitin and, 217, 222, 225–26, 234, 237–39
- Calbindin
 expression in macaque thalamus, 130, 135
- Calcium channel
 gain-of-function mutations of, 105–10
 epilepsy and, 105–10
- cAMP
 See Cyclic AMP
- CGMP
 See Cyclic GMP
- Caspase, 73–78, 82, 102, 233, 236–37
 ataxin-3 and, 233
 biochemical pathways of activation, 74–78
 apoptosis and, 73–78, 82
 cytochrome c release and, 75–78
- Caspase activated DNase, 74
- Cell-cell communication, 348
- Cell-cell recognition, 348
- Cell death, 236, 579–82, 593
 polyglutamine-mediated, 236
 See also Apoptosis; Regeneration
- Cell division, 531–50
 patterns
 neuroblast division in *Drosophila* CNS, 535–41
 stem cell-like division in vertebrates, 541–43
- differentiative neural precursor divisions
Drosophila, 543–45
 vertebrates, 545
- final progenitor cell cycle, 548–50
- late neurogenesis, 545–48
- specification of neural progenitor cells, 533–35
- Cell migration, 45
- Cerebellar climbing fibers, 483–85
- Channelopathies, 365–68, 384
- Chemoaffinity hypothesis, 345
- Chemosensation, 353
- Chromatin condensation
 apoptosis and, 73–75
- Circadian rhythms, 353, 713–37
 circadian clocks in mammalian cells, 732–36
 clock genes
 light responsiveness of, 729–32
 mammalian clock genes
 identification and mRNA expression patterns, 716–21
 mammalian cytochrome genes, 727–29
 molecular genetics of, 713–37
 molecular interactions, 724–25
 photic input pathways, 722–27
 temporal profiles of mRNA expression, 721–23
- Cognition
 premotor cortex and, 394, 406–8
 motor mental imagery and, 406–8
- Cognitive psychology, 350

- Cognitive science, 156-57
benefits of emotion
research to, 157
- Color vision, 743-70
- Computer science
cognitive neural science
and, 352
- Computerized axial tomography
development of, 351
- Conditioning
amygdala and, 155, 161-77
conditioned stimulus pathways, 161-66
contextual, 163
fear, 155, 159-77
hippocampus and, 159, 163-65
neuroanatomy of, 161-66
- Consciousness, 156-57, 175-77, 557-77
as a biological problem, 557-59, 576-77
building block model, 557, 570-73
definition of 559-60
feelings and, 156-57, 175-77
neurobiological correlates of, 558-59, 568-77
scientific study of, 568-70, 576-77
unified field model, 557, 573-77
unified qualitative subjectivity and, 557, 575
- Convergence, 1
- Cortex, 613-37, 649, 689-92
coding, 613-14, 619-37
population coding, 623-31
single neuron, 620-23
linking mental and neural representations, 631-37
contents, 632-35
function, 635-36
neural representation, 613-19, 631-37
cognition and behavior and, 631-37
content, 616-17
function, 617
representation and computation, 617-19
synaptic plasticity and, 689-92
See also Cortical coding
- Cortical coding, 613-14, 619-37
linking mental and neural representations, 631-37
contents, 632-35
function, 635-36
population coding, 623-31
coordinated-coding hypothesis, 627-29
coordinated noise, 629-31
independent-coding hypothesis, 624
population firing rates, 625-27
population maps, 624-25
single neuron coding, 620-23
rate-coding hypothesis, 620-21
sensory cortical area, temporal and spatial scales, 622-23
temporal-coding hypothesis, 621-22
- Cortical distance limit, 8, 10
- Cortical map plasticity, 1, 5-7, 18-19
- CREB
See Cyclic AMP-response element binding protein
- Critical bands
spectral integration in primary auditory cortex, 501, 515-23
- Cyclic AMP (cAMP)
neuronal survival and elevation and depolarization of, 582-92
- Cyclic AMP-response element binding protein (CREB)
neuronal survival and, 581
- Cyclic GMP (cGMP), 417, 426-31
olfactory response regulation by, 426-31
- Cyclic GMP-dependent protein kinase (PKG), 427
- Cyclic nucleotide-gated (cNG) cation channels, 420
- Cytochrome c, 73-78, 82
amyotrophic lateral sclerosis and, 81
apoptosis and, 73, 75-76
Bcl-2 family of proteins and, 75-78
neural development and, 76-78
- D**
- Dendritic transport, 57-39
dendritic targeting and, 58-59
- Dentatorubropallidolysian atrophy (DRPLA), 27, 219, 228-30
nuclear inclusions in, 228
- Divergence
cortical plasticity and, 1, 5, 7-12, 18-19
brainstem and, 7-8, 21, 28-29
limits on divergence-dependent, 11-12
thalamus and, 7-8
- Dopamine
modulation of ionic conductance, 192-95
modulation of synaptic transmission, 195-97
nucleus accumbens, 197-99

- striatum, 195-97
- neurons, 473, 480-82
- receptor activation in medium spiny cells, 198-89, 192-204
- receptor expression
 - nucleus accumbens, 189
 - striatal medium spiny neurons, 187-89
 - striatum, 187-89
- receptor subtypes, 186-87
- Dorsolateral prefrontal cortex, 486
- Drug addiction
 - dopaminergic modulation of neuronal excitability and, 186, 201-4
- Drug sensitivity
 - insecticides and Na⁺ channel inactivation, 100
- Dualism, 566-67
- Duchenne's muscular dystrophy, 356-59
 - dystrophin gene and, 356-59
- Dynein, 39-62
 - axonal transport and retrograde, 52, 54
 - slow, 51-52
 - motor attachment and regulation, 53-57
 - neuronal transport and, 39-62
 - nonneuronal transport and, 40-43
 - organization, 40-43
- E**
- Ear
 - See Inner ear
- Emotion, 155-77
 - amygdala and, 155, 161-77
 - cognitive science and, 156-59
 - integration, 157-59
 - conscious feelings and, 156-57, 175-77
 - limbic system, 155-59
 - unconscious processing mechanisms and, 157
- Epilepsy, 89, 105-10, 113
 - calcium channel mutations, 107-10
 - potassium channel mutations, 105-7
- Exocytosis, 349
 - unified qualitative subjectivity and, 557, 575
- F**
- Fear, 155, 159-77
 - conditioning, 155, 159-77
 - amygdala and, 155, 159-77
 - conditioned stimulus pathways, 161-66
 - contextual, 163
 - hippocampus and, 159, 163-65
 - neuroanatomy of, 161-66
- Functional brain imaging, 315, 318-33
- Functional magnetic resonance (fMRI), 315, 318-33, 351
 - development of, 351
 - selective attention in human visual cortex and, 315-16, 318-33
 - neural representation in object vision pathway, 317-21
 - top-down bias in, 321-33
- Frontal cortex, 486-87
- G**
- G-protein-coupled receptor, 89, 111-13, 418-22
 - gain-of-function mutations and, 89, 110-13
 - rhodopsin mutation, 111
 - RNA editing of, 112
- seven transmembrane receptors
 - olfaction and, 418-22
- Gain-of-function mutations, 89-113, 237-39
 - CAG repeats, 237-39
 - decreased drug sensitivity, 100
 - degenerens, 97-98
 - G protein-coupled receptors, 89, 111-13
 - GluR-B editing, 93-94
 - Kv8 subunits and, 99
 - Liddle syndrome, 101-2
 - lurcher* mouse, 94-95
 - neuronal nAChR, 96-97
 - rhodopsin, 111
 - slow-channel syndrome, 95-96
 - voltage-gated Na⁺ channels
 - persistent activation in, 98-99
 - weaver* mouse, 89-93
- Gating spring in inner ear, 288-91
- Gestalt psychology, 350
- Glia
 - axon growth and, 579, 595
- Glutamine repeats
 - See CAG repeats; Polyglutamine diseases
- Gracile fasciculus, 12
- Guanylyl cyclases, 417-31
 - model for odor recognition, 430-31
 - odor detection
 - cyclic GMP and, 417, 426-27
 - ligands, 427-29
 - receptors, 422-24
 - signaling pathways, 426-30
 - olfaction and, 417-31
 - in olfactory tissue, 425
 - regulation in olfactory neurons, 427-30
 - in retina, 424-25

H

- Hair cells, 285–309
transducer adaptation in,
285–309
calcium dependence,
299–303
extent, 298–99
latency, 294
motor model of, 285,
291, 303–9
step size and, 295, 297–
98
stimulus-response rela-
tion and, 293–94
transduction current
decay, 294–95

Hippocampus

- fear conditioning, 158,
163–65
LTP and, 665–84
synaptic plasticity and,
655–84

Huntington's disease (HD),

- 79–80, 217, 219–22,
229–35, 359–64
neural apoptosis and, 79–
80
neuronal inclusions in,
362–63
nuclear inclusions, 221
pathogenesis, 233–35
ubiquitin and, 222, 234

I

- Inferior colliculus, 503–4
Information processing, 350
Inner ear, 285–309
adaptation in the inner ear,
285–309
eustachian tube and, 287–
88
gating spring, 288–91
mechano-electrical trans-
duction, 285, 288–309
morphology, 286–87
receptor potential, 291–92
synaptic transmission,
292–93

- transducer adaptation in,
285–309
vestibular organ mechanics
prevailing models, 288
Intentionality
consciousness and, 557,
564
linking mental and neural
representations, 632–37
contents, 632–35
function, 635–36
Ion channel disorders, 343
Ion channel protein muta-
tions, 365–68
Ion channels
gain-of-function muta-
tions, 89–111, 112–13
cardiac long-QT syn-
drome, 89–90, 103–7,
113
drug sensitivity, 100
epilepsy, 89, 105–10
gating changes, 94–95
 K^+ channels $Kv\beta$ sub-
unit suppression, 99
Liddle syndrome, 101–2
persistent activation in
voltage-gated Na^+
channels, 98–99
selectivity changes, 90–
94
Ionic basis
of nerve impulse, 345
of synaptic transmission at
the neuromuscular junc-
tion, 345

K

- Kinesin, 39–62
fast anterograde axonal
transport and, 45–56
subunit structure and
organization, 48
motor attachment and
regulation and, 53–57
nonneuronal cell transport
and, 40–43

- organization, 40–43
retrograde transport and,
54
slow axonal transport and,
51–52
Koniocellular (K) pathway,
127–46
brainstem afferents, 137
corticogeniculate axons,
136–37
functional circuits of, 135–
39
heterogeneity in bushbaby
K layers, 139
innervation of extrastriate
cortex, 143–44
organization, 131–33
K cell distribution in
macaques, 131–32
K layers in primates,
133
quantitative analyses,
132–33
parallel pathways, 145–46
physiological properties of
K neurons, 139–42
S layer of, 129–30

L

- Lateral geniculate nucleus
(LGN), 127–46, 441–
66
developmental plasticity
in, 134–35
koniocellular channel of,
127–46
brainstem afferents, 137
development and plas-
ticity, 133–35
organization, 131–33
parallel pathways, 145–
46
retinal innervation, 135–
36
lamination, 134
ON, OFF subfields of, 445,
454

- orientation selectivity, 445-66
parallel visual processing in, 127, 145-46
relay cells of, 441
- Learning**
attention and, 473-95
conditional sensory-motor association, 400-5
intracortical circuits and, 405-6
learning sensory-motor adaptations, 404-5
motor skill learning, 399-405
movement repetition and practice, 401-2
movement sequence learning, 402-4
neuronal prediction errors and, 473-95
primary motor cortex and, 393, 399-406
sensory-motor adaptation, 400-5
- Learning and memory, 155, 161-77, 349-52, 649-94**
amygdala and, 171-73
back propagation learning algorithm, 352
consciousness and feelings, 175-77
fear conditioning and, 161-77
LTP and, 649-94
models of associative memory, 352
synaptic plasticity and, 649-94
synaptic plasticity and memory (SPM) hypothesis, 649-94
working memory, 175-77
- Lemniscal pathways, 1, 5-9**
cortical map plasticity and, 1, 5-9
- Liddle syndrome, 101-2**
- Limbic system, 155-59**
- Long-QT syndrome, 89-90, 103-5**
- Long-term depression (LTD), 649-62, 669**
properties of, 653-62, 669
- Long-term potentiation (LTP)**
amygdala-dependent learning and, 684-89
cortical learning and, 689-92
hippocampus-dependent learning and, 665-84
physiological plasticity in amygdala, 166-71
hippocampal, 167-71
properties, 653-61
input-specificity, 659
metaplasticity, 656-58
naturalistic patterns of induction, 658-59
silent synapses, 660
suggesting role in memory, 656-61
synaptic gain, 659
temporal persistence, 660-61
- M**
- Machado-Joseph disease**
pathogenesis, 232-33
spinocerebellar ataxia type 3, 222-23, 226, 232-33
- Manic depressive illness, 377-78**
- Maps of the body**
See Body representation
- Materialism, 566-67**
- Mechanoelectrical transduction, 285, 288-309**
calcium dependence, 299-303
extent, 298-99
latency, 294
motor model, 285, 291, 303-9
- step size and, 295, 297-98
stimulus-response relation and, 293-94
- Medium spiny neurons, 187-89, 192-204**
dopamine receptor mRNA expression in, 187-88
dopaminergic modulation of ionic conductances and, 192-97
synaptic transmission and, 195-97
electrophysiological behavior in vivo, 199-202
- Memory**
amygdala and, 171-73
consciousness and feelings, 175-77
working, 175-77
LTD and, 649-94
LTP's properties suggesting role in, 656-61
synaptic plasticity and memory hypothesis, 649-94
See also Learning; Learning and memory; Long-term potentiation; Synaptic plasticity
- Microtubule-based transport, 39-62**
neuronal migration and, 39, 60-61
- Migraine**
familial hemiplegic, 781-82
- Mind-body problem, 156, 566-68**
- Mitochondrial disorders, 343, 364-65**
Leber's hereditary optic neuropathy, 364-65
Leigh's syndrome, 365
mitochondrial myopathy, 364-65
- Molecular genetics, 352-55**

- Molecular motors, 39–62
 axonal transport and, 39, 45–56
 dendritic transport and, 57–59
 dynein, 39–62
 axonal transport and, 151–54
 motor attachment and regulation, 53–57
 nonneuronal transport and, 40–43
 organization, 40–43
 kinesin, 39–62
Monism, 566–67
Mood, 565
Motor mental imagery
 premotor cortex and, 406–8
Motor model of transducer adaptation, 285, 291, 303–9
 Ca^{2+} sensor, 307
 external Ca^{2+} chelator, 306
 mechanical resonance of hair bundles, 307
 myosin ATPase activity, 306
 voltage-evoked bundle movements, 305–6
Mutation
 gain-of-function
 See Gain-of-function mutation
Myasthenia gravis
 generation of antibodies against receptor, 345
Myotonia, 366–68
- N
- Nerve growth factor (NGF)
 discovery of, 345
 retrograde transport of, 53
Neural circuits
 intracortical circuits and learning, 405–6, 408–9
 primary motor cortex and, 393, 405–6, 408–9
Neural progenitors
 cell division leading to specification of, 533–35
 Drosophila, 533–34
 vertebrates, 534–35
 cell division pattern
 neuroblast division in *Drosophila* CNS, 535–41
 stem cell-like divisions in vertebrates, 541–43
 differentiative neural precursor divisions
 Drosophila, 543–45
 vertebrates, 545
 final progenitor cell cycle, 548–50
 precursor cell cycles during late neurogenesis, 545–48
Neural representation, 613–37
 cognitive and behavioral processes and, 631–37
 contents of, 616–17, 632–35
 function, 617, 635–36
 linking mental and neural representation
 contents, 632–35
 function, 635–36
 representation and computation, 617–19
Neural signal
 cortical coding and, 613–14, 619–37
 coordinated-coding hypothesis, 627–29
 independent-coding hypothesis, 624
 rate-coding hypothesis, 620–21
 neural representation and, 613–37
Neurobiological correlates of conscious states, 558–59, 568–77
Neurobiology
 origins of, 343–55
 cognitive neuroscience and, 349–52
 molecular genetics and, 352–55
Neurodegeneration
 CAG repeats and, 217–39
 Huntington's disease, 217, 219–22, 229–30, 233–35
 spinobulbar muscular atrophy, 218–20, 229–30, 237
 spinocerebellar ataxias (SCA), 217, 219, 222–28, 231–33
 protein aggregation and, 217, 230, 236–39
Neurodegenerative disorders, 368–75
 Alzheimer's disease, 343, 368, 372–75
 β -amyloid precursor protein, 373–74
 presenilins, 374–75
 amyotrophic lateral sclerosis (ALS), 343, 368–70
 Parkinson's disease, 343, 368, 370–72
 candidate genes, 371–72
Neurogenetics, 352–85
Neurogenin, 534–35
Neuronal atrophy
 reorganization and, 1
Neuronal differentiation, 531, 548–50
 initiation of, 548–50
Neuronal excitability, 185–204
Neuronal inclusions, 362–63
Neuronal migration, 39, 60–61
Neuronal pathfinding, 39
Neuronal signaling
 molecular genetics and, 352–54

- Neuronal survival, 579-92
 cAMP elevation and, 582-92
 electrical activity and, 583, 585-88
 neuronal survival in vivo, 587-88
 trophic responsiveness in vitro, 585-87
 extrinsic control of, 582-83
 neurotrophic hypothesis of, 591-92
 peptide trophic factors and, 581-82
 regeneration and, 579-602
Neurotrophic factor, 580
Neurotrophins, 579-602
 neuronal responsiveness to activity and, 585-87
 neuronal survival and neurotrophic hypothesis of, 591-92
Nociception
 See Pain
Nociception/orphanin FQ, 801-2
Norepinephrine neurons, 473, 482-83
Nuclear inclusions, 217, 221, 228
 in dentatorubropallidoluysian atrophy, 228
 in Huntington's disease, 221
Nucleus accumbens, 185-204
 dopaminergic modulation, 190-97
 ionic conductances, 192, 194-95
 synaptic transmission, 197
Nucleus basalis neurons, 473, 483
- O**
Object recognition, 315-33
 neural representation in object vision pathway, 317-21
 competition for, 317-21
 selective attention, 315-33
 baseline shift, 325-26
 bottom-up, sensory-driven mechanisms, 315-17, 332-33
 filtering, 323-25
 functional brain imaging studies, 315, 318-33
 lesion studies, 327-28
 sensory suppression and, 319-21
 top-down bias in, 321-33
 working memory and, 317, 330-33
Odorant receptors
 guanyl cyclases, 417-31
 odor recognition, 421
 seven transmembrane, 418-22
 signaling pathways, 419-21
Olfaction
 G-protein-coupled seven transmembrane receptors, 418-22
 signaling pathways, 419-21
 guanyl cyclases and, 417-31
 cGMP and, 426-31
 receptors, 422-26
 signaling pathways, 426-30
 odor recognition model for, 421-22, 430-31
 vomeronasal organ (VNO), 419, 422
Opsin, 45
Orbitofrontal cortex, 486-87
Orientation selectivity, 441-66
 contrast invariance of, 450-66
 cortical computation and, 464-66
 feedback models of, 460-66
 feed-forward model, 441-60, 464-66
 failures of, 450-58
 geniculate relay cells and, 445
 spatial organization of geniculate input to, 445-46
 spike threshold, 450
 push-pull inhibition, 454-58
 same-phase excitation, 457-58, 464-66
- P**
p75, 793
Pain
 cannabinoid receptor, 802
 genes, 777-803
 involved in modulation of, 797-800
 genetics of, 777-803
 single gene polymorphisms, 781
 neurobiology of, 778-80
 neurotrophins and, 791-93
 nociception/orphanin FQ, 801-2
 polygenic mediation of, 783-86
 second messenger molecules, 795-97
 sympathetic nervous system and, 790-92
Parallel pathways, 127, 145-46, 743-70
 koniocellular pathway and, 127-46
 spectral coding in primate retina and, 743-70
Parkinson's disease, 185, 343, 368, 370-72
 candidate genes, 371-72
Parvalbumin, 130

- Phototropism, 353
- Plasticity
- afferent-dependent, 2
 - body representation and, 1, 5-7, 18-19, 21-29
 - cortical map, 1, 5-7
 - cortical mechanisms of map plasticity, 21-25
 - developmental
 - koniocellular pathway and, 133-35
 - divergence-dependent, 1, 5, 7-12
 - limits on, 11
 - GABAergic inhibition and, 26-28
 - neuronal prediction errors and, 490-92
 - physiological
 - amygdala and, 166-71
 - primary motor cortex and, 393-409
 - electrical stimulation mapping, 396-99
 - LTD and, 398-99
 - LTP and, 398-99
 - See also Synaptic plasticity
- Polarity, 531, 539-41
- epithelial apicobasal cues, 540-41
- Polyglutamine diseases, 217-39
- CAG repeats, 27-39
 - inverse relationship
 - between size of repeat and age of onset, 288-30
 - pathogenesis, 231-39
 - gain-of-function mutation, 237-39
 - Huntington's disease, 233-35
 - invertebrate models, 235-36
 - in vitro and cell culture models, 236-37
 - protein aggregation, 217, 230, 236-39
 - spinocerebellar ataxias, 231-33
 - ubiquitin and, 217, 222, 225-26, 234, 237-39
 - phenotypic overlap and loss of cell specificity, 230
 - protein aggregation, 217, 230, 236-39
- Positron emission tomography
- development of, 351
- Potassium channel
- gain-of-function mutations of, 104-7
 - cardiac long-QT syndrome, 89-90, 103-5
 - epilepsy, 105-7
- Prediction errors, 473-95
- attention and, 477-95
 - cerebellar climbing fibers and, 483-85
 - dopamine neurons and, 473, 480-82
 - frontal cortex, 486-87
 - functions, 489
 - learning and, 473-95
 - neuronal plasticity and learning, 490-92
 - norepinephrine neurons and, 473, 482-83
 - nucleus basalis neurons and, 473, 483
 - reinforcement, 489-90
 - striatum, 488
 - superior colliculus, 485-86
 - visual cortex, 487-88
- Prefrontal cortex, 379-84
- schizophrenia and, 379-84
 - working memory and, 379-84
- Primary auditory cortex (AI), 501-23
- characteristic frequency, 505-22
 - multi peaked curves, 510-12
 - single peaked tuning curves, 505-10
 - spectral integration, 501-23
 - neuroanatomy of, 517-19
 - neuronal critical bands and, 501, 515-23
 - topography, 513-15, 519
 - subregions, 516-17
- Primary motor cortex
- cognitive activities and, 394, 406-8
 - intracortical circuits and, 405-6
 - learning sensory-motor adaptations, 404-5
 - mental rehearsal of movements, 407-8
 - movement repetition and practice, 401-2
 - movement sequence learning, 402-4
 - learning and, 393, 399-406
 - conditional sensory-motor associations, 400-5
 - motor-skill, 399-405
 - sensory-motor adaptation, 400-5
 - plasticity and, 393-409
 - electrical stimulation mapping, 396-99
 - LTD and, 398-99
 - LTP and, 398-99
 - representation patterns and, 393-96, 408
 - somatotopy, 393-96
 - voluntary movement, 393-409
- Proneural clusters, 533-34
- Protein aggregates, 217, 230, 236-39
- polyglutamine diseases and, 217, 230, 236-39
 - in vitro and cell culture models, 236-37
- Psychophysics, 352

Q

Qualitativeness, 557, 560-61, 575

R

Rate-coding hypothesis, cortical coding, 620-21

Regeneration

axon growth and, 579, 592-602
cAMP elevation and, 582-92
differences in CNS and PNS, 580, 582-83
neuronal survival and, 579-92
neurotrophic hypothesis of, 591-92
peptide trophic factors and, 581-82
retinal ganglion cells, 579

Relay cells of LGN, 441

Reorganization, 1-29

amputation and, 1-2
brainstem and, 1, 7-8, 13-16, 21, 26-29
neuronal atrophy and, 1
somatosensory cortex plasticity and, 1, 5-7, 89-19, 21-29
thalamus and, 1, 5-21, 26-29

Repeat disorders

See CAG repeats; Polyglutamine diseases; Trinucleotide repeat disorders

Representation

See Body representation;
Neural representation-
Restriction fragment length polymorphisms, 355-56

Retina

bipolar cell recording, 274-76
circuitry, 249-77
ganglion cell recording, 272-74

genetic manipulation, 261-70

cell-specific ablation, 266-68
particle-mediated gene transfer, 269-70
transgenic mice, 264-70
viral vectors, 268-69
guanylyl cyclases in, 424-25
methods for visualizing cellular components, 254
individual cells, 252-53
living cells, 257-61
synaptic connections, 255-57

quantifying cell populations, 270-72

spectral coding in primate-parallel pathways for, 743-70

Retinal ganglion cells

(RGCs), 579, 582, 585, 595
regeneration of, 579

Retinal innervation of koniocellular layers, 135-36

Retinal transgenes, 261-70

Retrograde axonal transport, 52-54

Rhodopsin gain-of-function mutations in, 111

S

Schizophrenia, 186, 376-85

prefrontal cortex and, 379-84
working memory and, 378-84

Selective attention in human visual cortex, 315-33

bottom-up sensory-driven mechanisms, 315-17
competition for neural representation, 317-21
filtering, 323-25
baseline shift, 325-26

functional brain imaging studies, 318-33

lesion studies, 327-28
sensory suppression and, 319-21
top-down feedback mechanisms, 316-17, 321-33

Sensory transduction, 285-309

transducer adaptation, 285-309
motor model of, 285, 291, 303-9

Simple cells

geniculate input to, 445-66

contrast-dependent effective threshold, 453
contrast invariance of, 450-66
orientation tuning of, 449-50
same-phase excitation, 457-58, 464-66
spatial organization of, 445-46
spike threshold, 450
strength of, 446-49

Slow-channel congenital myasthenic syndrome, 95-96

Sensory cortex

plasticity in, 1-29
brainstem and, 1, 7-8, 21, 26-29
cortical mechanisms of, 21-25
GABAergic inhibition and, 26-28
thalamus and, 1-21, 26-29

Spinal cord, 345

Spinobulbar muscular atrophy (SBMA), 217-20, 229-30, 337

Spinocerebellar ataxias (SCA), 217, 219, 222-28, 231-33

- pathogenesis, 231-33
types 1 and 2, 223-26
type 3 (Machado-Joseph disease), 222-23, 226
types 6 and 7, 226-28
- Striatum, 185-204, 488
dopamine receptor expression in, 187-89
dopaminergic modulation, 190-97
 ionic conductances, 192-94
 synaptic transmission, 195-97
- Subjectivity
 consciousness and, 557, 561, 566, 575
 emotion studies, 156-57
 linking mental and neural representations, 632-37
 contents, 632-35
 function, 635-36
- Suckling behavior, 430
- Superior colliculus, 485-86
- Synaptic plasticity
 amygdala-dependent learning and, 684-89
 cortical learning and, 689-92
 dopamine effects on, 197-99, 204
 hippocampus-dependent learning, 649, 665-84
 LTD and, 649-62, 669
 LTP and, 649-94
 and memory, 649-94
 microtubule-based transport and, 39, 62
 properties that suggest role in learning, 655-56
- Synaptic plasticity and memory (SPM) hypothesis, 650-94
 assessment criteria, 651-53
- Synaptic transmission, 185, 195-204
 dopaminergic modulation of, 195-97, 204
- nucleus accumbens, 197-99
 striatum, 195-97
- T**
- Temporal coding, 621-23
 hypothesis, 621-22
- Thalamus, 1-21, 26-29
 lemniscal fibers and, 1, 5-9
 plasticity in somatosensory cortex and, 1, 5-21, 26-29
 reorganization in, 1, 12-19
 transneuronal atrophy in, 13-19
 ventral posterior nucleus of, 8-11
- Tourette's syndrome, 180
- Transducin, 45
- Transgenes, 249, 261-70
 retinal, 261-70
- Transport
 axonal, 39, 45-56
 dendritic, 57-59
 microtubule-based, 39-62
 neuronal, 39-40; 44-62
 nonneuronal, 40-43
- Trinucleotide repeat disorders
 CAG repeats, 217, 39, 362
 Fragile X repeats, 362
 polyglutamine diseases, 217-39
 Huntington's disease, 359-64
- Triplet repeats
 See Trinucleotide repeat disorders
- U**
- Ubiquitin, 217, 222, 225-26, 234, 237-39
 in Huntington's disease, 222, 234
 pathogenesis of polyglutamine diseases and, 217, 222, 225-26, 234, 237-39
- Unity
 consciousness and, 557, 561-64, 575
- V**
- Vision, 127-46, 315-33, 441-66, 487-88
 color vision, 743-70
 frontal eye fields, 487
 See also Object recognition; Orientation selectivity; Selective attention; Visual cortex; Visual system
- Visual cortex
 competition for neural representation, 317-21
 innervation of
 koniocellular cells and, 142-44
 koniocellular pathway and, 127, 142-46
 neuronal prediction errors and, 487-88
 orientation selectivity, 441-66
 feedback models of cortical function, 460-66
 feed-forward model, 441-60, 464-66
 push-pull inhibition, 454-58, 464-66
 same-phase excitation, 457-58, 464-66
 selective attention in human, 315-33
 top-down bias in, 321-33
 baseline shift, 325-26
 filtering, 323-25
 functional brain imaging studies, 315
 increased response sensitivity, 326
 lesion studies, 327-28
 response enhancement, 321-23, 326
 working memory and, 317, 330-33

Visual system

monkey

- calbindin expression,
130, 135
- koniocellular neuron
distribution in, 131-33
- koniocellular neuron,
physiological properties,
139-42
- koniocellular pathway,
127-46

Voluntary movement, 393-

- 409
- primary motor cortex and,
393-409

conditioned sensory-

- motor association,
400-5

intracortical circuits
and, 405-6motor mental imagery,
406-8motor-skill learning,
399-405movement sequence
learning, 402-4sensory-motor adapta-
tions, 404-5Vomeronasal organ (VNO),
419, 422**W***weaver* mouse, 89-93

- G protein-gated inward
rectifier channel of, 90-
93

Working memory

- prefrontal cortex and, 379-
84

schizophrenia and, 378-84

- selective attention and,
317, 330-33

